

Claims

We claim:

5 1. A method of making a composite metal powder comprising:

(a) combining particles of tungsten or molybdenum metal  
with particles of silver oxide or copper oxide in an aqueous  
hydroxide solution;

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(b) heating the solution to a temperature and for a time  
sufficient to convert the silver oxide or copper oxide particles  
to silver or copper metal particles, said silver or copper metal  
particles being substantially adhered to the tungsten or  
15 molybdenum metal particles.

2. The method of claim 1 wherein the hydroxide solution has a  
hydroxide concentration from 1 to 14 M.

20 3. The method of claim 1 wherein the solution is heated to a  
temperature from about 60°C to about 95°C.

4. The method of claim 1 wherein the hydroxide solution is  
formed with ammonium hydroxide or sodium hydroxide.

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5. The method of claim 3 wherein the hydroxide solution is an  
aqueous ammonium hydroxide solution.

6. The method of claim 5 wherein the aqueous ammonium  
30 hydroxide solution contains 10 to 90 percent water and 90 to 10  
percent 14.5 M ammonium hydroxide by volume.

7. The method of claim 5 wherein the aqueous ammonium hydroxide solution has a concentration of about 7 M ammonium hydroxide.

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8. The method of claim 5 wherein the solution is heated for about 10 minutes to about 5 hours.

9. The method of claim 8 wherein the aqueous ammonium hydroxide solution contains 10 to 90 percent water and 90 to 10 percent 14.5 M ammonium hydroxide by volume.

10. The method of claim 1 wherein the composite metal powder has a silver or copper content of from 2 percent to 60 percent by weight.

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11. A method of making a composite metal powder comprising:

(a) combining particles of tungsten or molybdenum metal with particles of  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  in an aqueous hydroxide solution;

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(b) heating the solution to a temperature of from about  $60^\circ\text{C}$  to about  $95^\circ\text{C}$  for a time sufficient to convert the  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  particles to silver or copper metal particles, said silver or copper metal particles being substantially adhered to the tungsten or molybdenum metal particles.

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12. The method of claim 11 wherein the aqueous hydroxide solution is formed with ammonium hydroxide or sodium hydroxide.

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13. The method of claim 11 wherein the hydroxide solution has a hydroxide concentration from 1 to 14 M.

14. The method of claim 11 wherein the hydroxide solution is aqueous ammonium hydroxide.

15. The method of claim 14 wherein the aqueous ammonium hydroxide solution contains 10 to 90 percent water and 90 to 10 percent 14.5 M ammonium hydroxide by volume.

16. The method of claim 14 wherein the aqueous ammonium hydroxide solution has a concentration of about 7 M ammonium hydroxide.

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15 ~~18~~. The method of claim 14 wherein the solution is heated for about 10 minutes to about 5 hours.

18 ~~19~~. The method of claim 15 wherein the aqueous ammonium hydroxide solution has a concentration of about 7 M ammonium hydroxide.

19 ~~20~~. The method of claim 11 wherein tungsten or molybdenum metal particles have a FSSS size of from about 0.5  $\mu\text{m}$  to about 30  $\mu\text{m}$  and the  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  particles have a FSSS size of from about 1  $\mu\text{m}$  to about 6  $\mu\text{m}$ .

20 ~~21~~. The method of claim 11 wherein the composite metal powder has a silver or copper content of from 2 percent to 60 percent by weight.

21 ~~22~~. A method of making a composite metal powder comprising:

(a) combining particles of tungsten or molybdenum metal with particles of  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  in an aqueous ammonium hydroxide solution, the tungsten or molybdenum metal particles having a  
5 FSSS size of from about  $0.5\ \mu\text{m}$  to about  $30\ \mu\text{m}$  and the  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  particles having a FSSS size of from about  $1\ \mu\text{m}$  to about  $6\ \mu\text{m}$ ;

(b) heating the solution to a temperature of from about  
10  $60^\circ\text{C}$  to about  $95^\circ\text{C}$  for about 10 minutes to about 5 hours to convert the  $\text{Ag}_2\text{O}$  or  $\text{Cu}_2\text{O}$  particles to silver or copper metal particles, said silver or copper metal particles being substantially adhered to the tungsten or molybdenum metal particles and the composite metal powder having a silver or  
15 copper content of from 2 percent to 60 percent by weight.

2220. The method of claim 19 wherein the aqueous ammonium hydroxide solution has a concentration of about 7 M ammonium hydroxide.